Temperature Controller *LC SERIES*

INSTRUCTION MANUAL

Please read this manual carefully and keep this manual for further reference

Features

- LCD three color VA display, bar graphic,output percentage MV1/MV2 or feedback MVFb display
- 0.2% measuring accuracy, maximum resolution 0.1 for TC and RTD input
- Output: relay, SSR drive, analog, triac,re-transmission
- Alarm:AL1/AL2 relay output, excitation, non-excitation, delay output, alarm lock function
  Alarm mode: PV, deviation, absolute, band, alarm standby, PV deviation alarm ramp start-up alarm, ramp end alarm, Loop break alarm,heater break alarm
- Control mode: PID with auto-tuning, on/off, heating or cooling, heating+cooling, 3 wires proportional valve control, valve control with feedback signal, output restrain
- Program version: PID mode, ramp up mode, temp constant mode, soft-start
- Add-on feature: auto/manual control, run/stop function, even SV input
- Special features: all parameters distributed in three levels, parameters can be manually designate to different level
- Communication: RS-485, modbus-RTU, pattern 8-(N,O,E)-(1,2)
- Ambient temp 0-50^{0}C, humidity 0-80%RH

1: Model number and ordering information

Please check this ordering information and specify the code when order with us

Model Item number(Panel size: width x height)	LC108 (48mmX48mm) LC408 (48mmX96mm) LC508 (96mmX48mm) LC708 (72mmX72mm) LC908 (96mmX96mm)

CODE

□□-□□□□-□□*□□□-□□-□□□□

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16)

(1) Power supply
B: AC85~265V D: DC24V

(2) Controller type
U: Standard PID type T: Temperature constand mode(with timer) R: Ramp and soak mode(with timer)

(3)Control action
F: ReversePID action (for Heating) D: Direct PID action (for cooling)
W: Heat/cool double PID action B: ON/OFF control（for heating）
M: ON/OFF control（for cooling）

(4) Input type，(5) Range code: See"15.INPUT RANGE TABLE"

(6) First control output [OP1] (or valve open)
N: No action
M: Relay contact V: Voltage pulse(for SSR)
2: Current(DC0~20mA) 8: Current(DC4 ~ 20 mA)
5: 0~5VDC 6: 0~10VDC
7: 1~5VDC T:Triac single phase zero crossing control
A: Relay output for motor valve open action

(7)Second control output [Op2](Double PID Cool-side output or valve colse)
N: No action
M: Relay contact V: Voltage pulse(for SSR)
2: Current(DC0~20mA) 8: Current(DC4 ~ 20 mA)
5: 0~5VDC 6: 0~10VDC
7: 1~5VDC T:Triac single phase zero crossing control
A: Relay output for motor valve colse action

(8) Alarm 1[AU1], (9) Alarm 2[AU2]
A: Deviation high alarm B: Deviation low alarm
C: Deviation high/low alarm D: Deviation band alarm
E: Deviation high alarm with hold action F: Deviation low alarm with hold action
G: Deviation high/low alarm with hold action M: Deviation band alarm with hold action
H: Process high alarm J: Process low alarm
K: Process high alarm with hold action L: Process low alarm with hold action
V: SV high alarm W: SV low alarm P: PV value over flow alarm
3: Timer kick-in alarm 4: Timer finish alarm R: LBA loop break alarm
Q: Heater short circuit alarm (HBA)

(10) Remark code: N

(11) Communication N: No Communication 5: Rs485 communication Modbus-RTU

(12) Aux power source
N: No auxpower
A: 24VDC isolated B: 24VDC grounded C:12VDC isolaged D: 12VDCgrounded
E: 9VDC isolaged F: 9VDC grounded G: 5VDC isolaged H: 5VDCgrounded

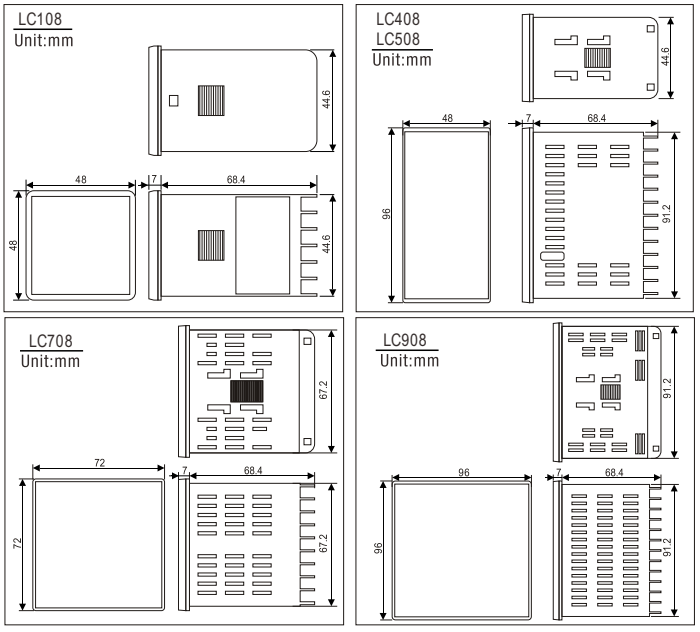
(13) Transmission [Op2 terminal output or Au3 output]
N: no transmission A: 4-20mA(OP2) B: 0-20mA(OP2) C: 0-5VDC(OP2) D: 1-5VDC(OP2)
E: 0-10VDC(OP2) F: 4-20mA(AU3) G: 0-20mA(AU3) H: 0-5VDC(AU3) J: 1-5VDC(AU3)
K: 0-10VDC(AU3)

(14) INPUT2 for position feedback
N: no input2 A: 4-20mA B: 0-20mA C: 0-5V/resistance input for valve feedback D:1-5V E: 0-10V

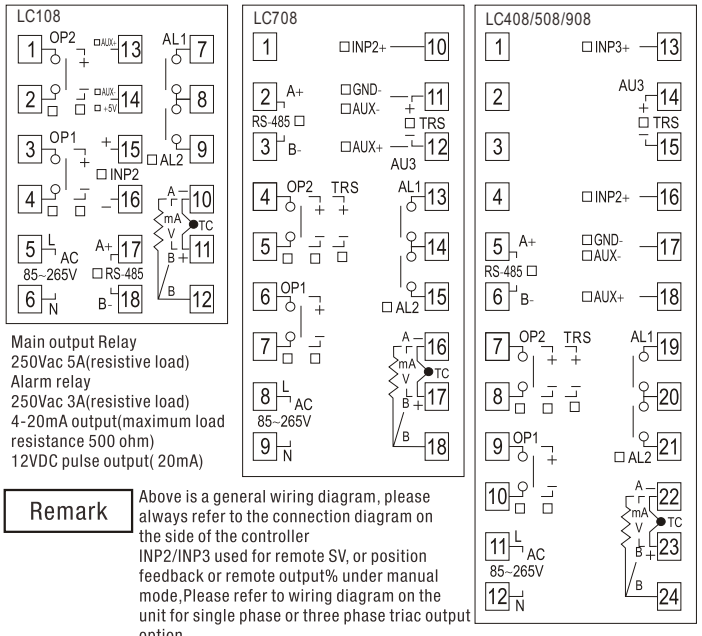
(15) Remote SV setting(INPUT2 or INPUT3)
N: NO remote sv A: 4-20mA(INP2) B: 0-20mA(INP2) C: 0-5V(INP2) D: 1-5V(INP2)
E: 0-10V (INP2) F: 4-20mA(INP3) G: 0-20mA(INP3) H: 0-5V(INP3)
J: 1-5V(INP3) K: 0-10V(INP3) W: D1/D2 event input

(16) Manual output% remote setting (input2 or iput3)
N: NO remote A: 4-20mA(INP2) B: 0-20mA(INP2) C: 0-5V(INP2) D: 1-5V(INP2)
E: 0-10V (INP2) F: 4-20mA(INP3) G: 0-20mA(INP3) H: 0-5V(INP3)
J: 1-5V(INP3) K: 0-10V(INP3)

2. Size and mounting



3. Wiring diagram

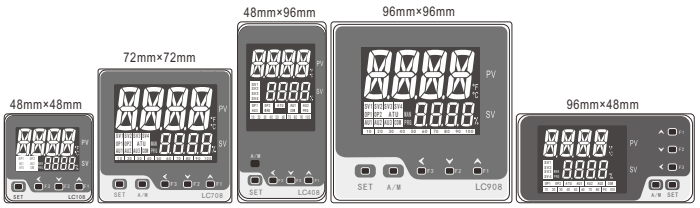


Main output Relay
250Vac 5A(resistive load)
Alarm relay
250Vac 3A(resistive load)
4-20mA output(maximum load resistance 500 ohm)
12VDC pulse output(20mA)

Remark

Above is a general wiring diagram, please always refer to the connection diagram on the side of the controller
INP2/INP3 used for remote SV, or position feedback or remote output% under manual mode,Please refer to wiring diagram on the unit for single phase or three phase triac output option

4. Panel description



PV window:display PV and parameter notation
SV window:display SV and parameter value
Bar graphic: indicate output%,feedback value or re-transmission value

OP1: Indicate OP1 status
OP2: Indicate OP2 status
ATU: Indicate auto-tuning status
AU1: AL1 alarm status
AU2: AL2 alarm status
AU3: Reserved light
MAN: Manual control/soft-start indication
COM: Communication indication
PRG: Temp constant mode indication
Ramp and soak indication

SET: Main function key
A/M:Auto/manual switch key and enter key
:Shift key(F3 function key, such as ATU fast initiated or go back to previous parameter)
:Numeric decrease(F2 function key)
:Numeric increase(F1 function key, Run/Stop)
SV1: Event input SV1 indication
SV2: Event input SV2 indication
SV3: Event input SV3 indication
SV4: Event input SV4 indication
SV1 and SV2 light together indicate remote-SV

5. Setting and programming

5.1 Power on initialization

Power on stage shows the software version and edition, input type and setting value range

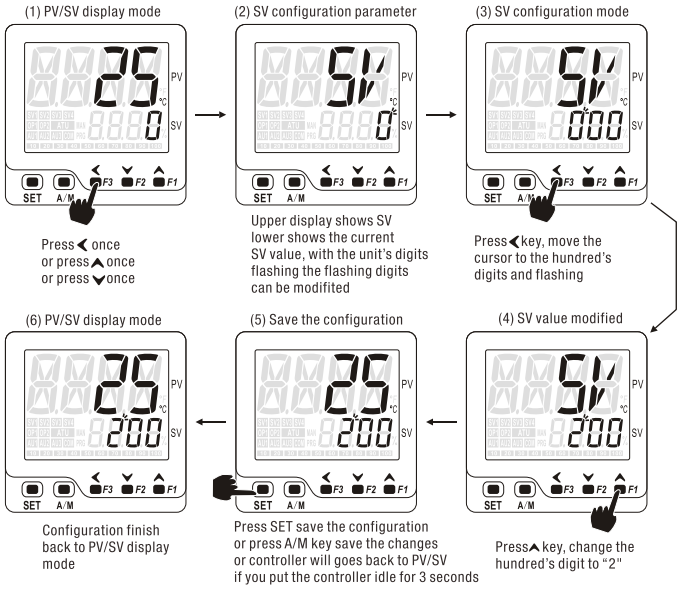
Notation	K	E	J	N	Wu3_Re25	S	t
Sensor type	K	E	J	N	Wu3_Re25	S	t
Range	-15 to 1300℃ 0 to 2600°F	-15 to 800℃ 0 to 1560 °F	-15 to 1000℃ 0 to 1950 °F	-15 to 1300℃ 0 to 2600 °F	0 to 2200℃ 0 to 3276 °F	0 to 1600℃ 0 to 3000 °F	-15 to 400℃ 0 to 782 °F

Notation	r	b	AN1	AN2	F3	F4	Pt
Sensor type	r	b	DC0-50mV	DC10-50mV	Reserved	Reserved	Pt100
Range	0 to 1769℃ 0 to 3216 °F	0 to 1800℃ 0 to 3276 °F	-1999 to 9999	-1999 to 9999	Reserved	Reserved	-199 to 800℃ -326 to 1472 °F

5.1 SV configuration and parameter configuration

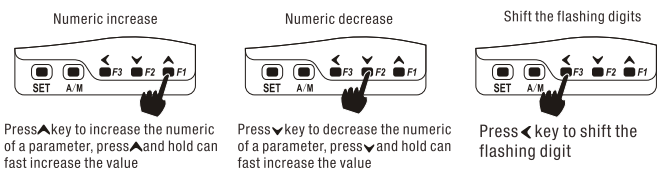
5.2.1 How to change the SV setting value, use the short cut key.

For example: change the SV from 0 to 200°C

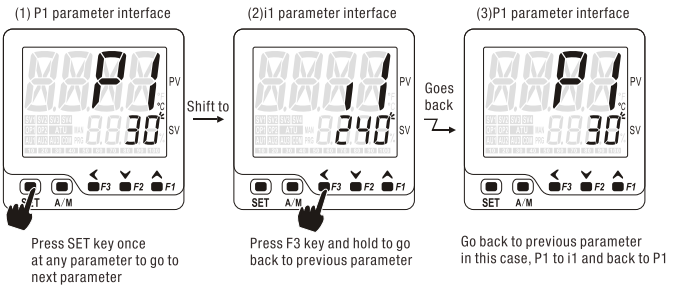

(1) PV/SV display mode
(2) SV configuration parameter
(3) SV configuration mode
Press ❮ once
or press ▲once
or press ❯once
Upper display shows SV
lower shows the current
SV value, with the unit's digits
flashing the flashing digits
can be modifited
Press ❮key, move the
cursor to the hundred's
digits and flashing
(6) PV/SV display mode
(5) Save the configuration
(4) SV value modified
Configuration finish
back to PV/SV display
mode
Press SET save the configuration
or press A/M key save the changes
or controller will goes back to PV/SV
if you put the controller idle for 3 seconds
Press▲key, change the
hundred's digit to "2"

Remark 1: SV setting parameter can be assigned to different parameter menus, referto S.F00 parameter for details
Remark 2: SV remote setting details, refer to "10. SV remote setting for more information"

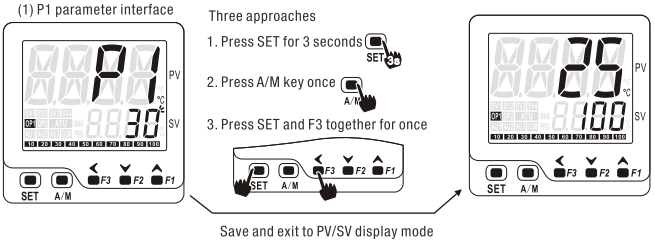
5.2.2 How to configure all configurable parameters


Numeric increase
Numeric decrease
Shift the flashing digits
Press▲key to increase the numeric of a parameter, press▲and hold can fast increase the value
Press❯key to decrease the numeric of a parameter, press❯and hold can fast increase the value
Press ❮ key to shift the flashing digit

5.2.3 Shift between parameters and go back to previous parameter


(1) P1 parameter interface
(2)i1 parameter interface
(3)P1 parameter interface
Shift to
Goes back
Press SET key once at any parameter to go to next parameter
Press F3 key and hold to go back to previous parameter
Go back to previous parameter in this case, P1 to i1 and back to P1

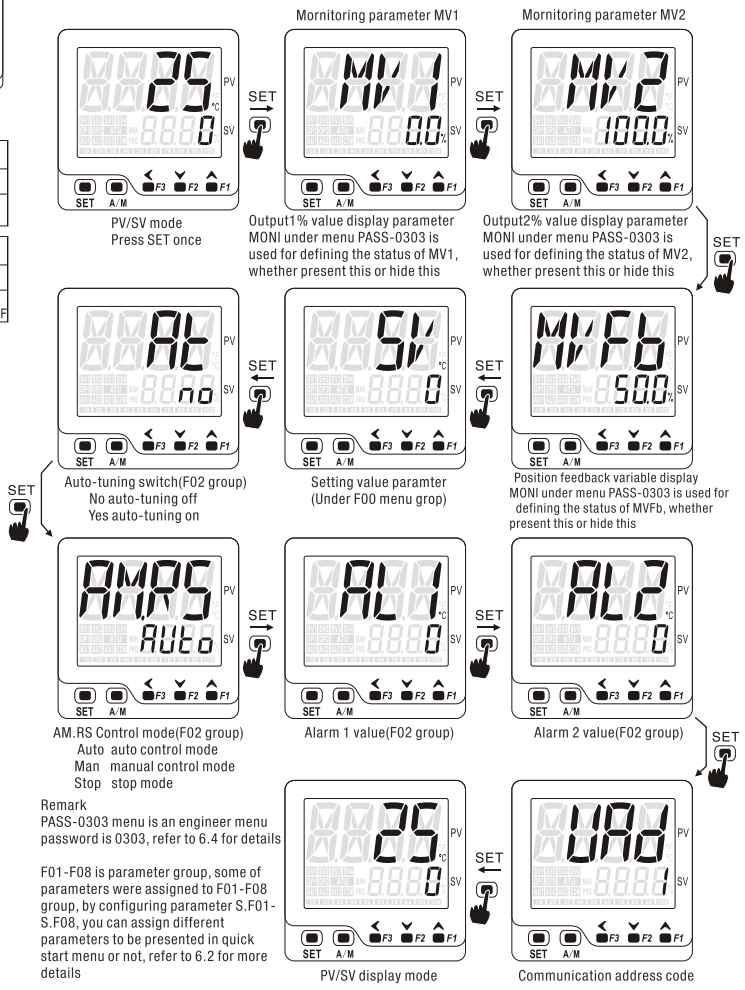
5.2.4 Save configuration and go back to normal PV/SV display mode


(1) P1 parameter interface
Three approaches
1. Press SET for 3 seconds
2. Press A/M key once
3. Press SET and F3 together for once
Save and exit to PV/SV display mode

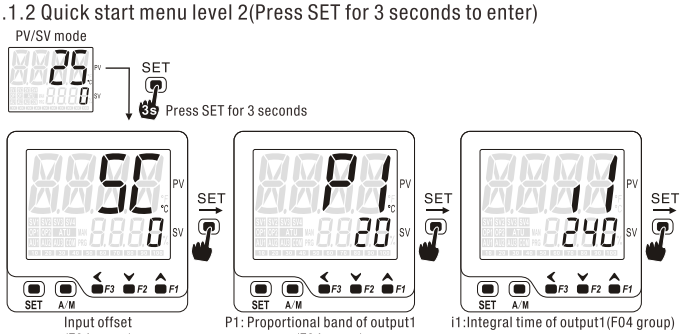
6. Parameter menu

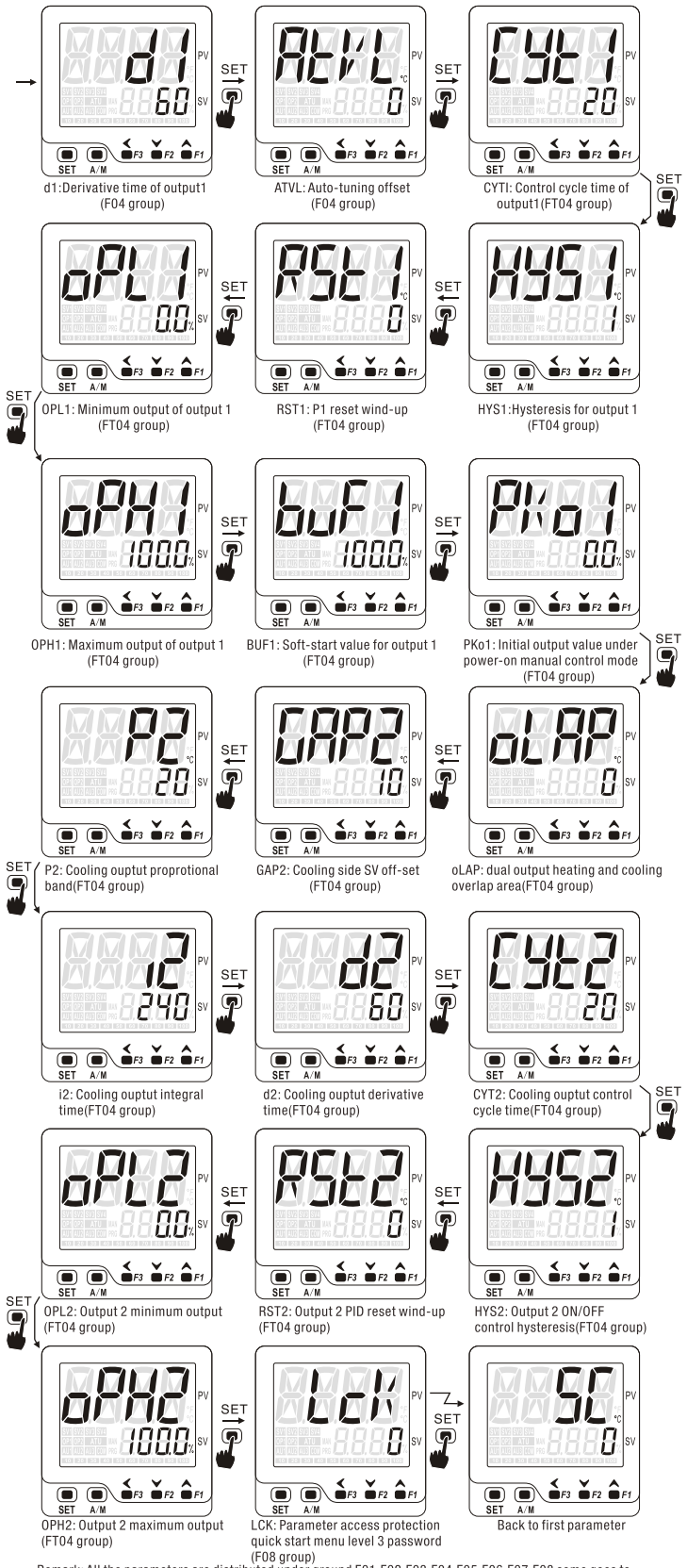
6.1 Factory default parameter menu

6.1.1 Quick start menu level 1(Press SET once to enter this menu)


Mornitoring parameter MV1
Mornitoring parameter MV2
PV/SV mode
Press SET once
Output1% value display parameter MONI under menu PASS-0303 is used for defining the status of MV1, whether present this or hide this
Output2% value display parameter MONI under menu PASS-0303 is used for defining the status of MV2, whether present this or hide this
Auto-tuning switch(F02 group)
No auto-tuning off
Yes auto-tuning on
Setting value paramter
(Under F00 menu grop)
Position feedback variable display MONI under menu PASS-0303 is used for defining the status of MVFb, whether present this or hide this
AM.RS Control mode(F02 group)
Auto auto control mode
Man manual control mode
Stop stop mode
Alarm 1 value(F02 group)
Alarm 2 value(F02 group)
Remark
PASS-0303 menu is an engineer menu password is 0303, refer to 6.4 for details
F01-F08 is parameter group, some of parameters were assigned to F01-F08 group, by configuring parameter S.F01-S.F08, you can assign different parameters to be presented in quick start menu or not, refer to 6.2 for more details
PV/SV display mode
Communication address code

6.1.2 Quick start menu level 2(Press SET for 3 seconds to enter)



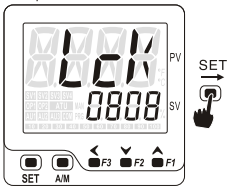


Remark: All the parameters are distributed under ground F01,F02,F03,F04,F05,F06,F07,F08 some goes to group F01 and others goes to F02 etc. S.F01-S.F08 parameter is used to define whether present or hide specific parameters under different menu group

6.1.2 Quick start menu level 3(custom menu,access with password)

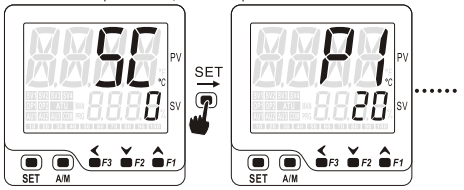
This is a customized menu, you can put those frequently used parameters which likely being incorrectly manipulated under this menu, password is required if you want to access to this menu this will provent unauthorized access and configuration

LcK: password to access menu level 3



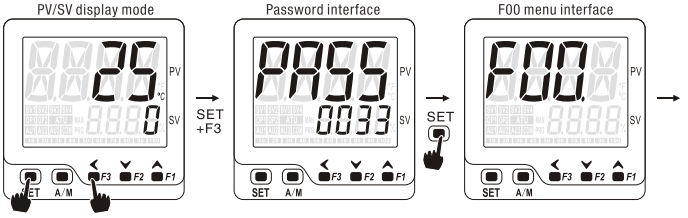
LcK: quick start menu(F08)
S.F08 parameter defines the presence of this menu
when LcK=0808, press SET key

Customized parameters,there is no parameters under this menu as factory default



Remark: F01-F06, parameters were distributed to these groups
S.F01-S.F06 used to define the presence of these parameter groups
refer to "6.2 basic functional menu(F menu)" for more details

6.2 Basic functional parameter menu(F menu)



Press SET and F3 key once, goes to password interface

Set PASS=0033 enter into F menu

F00 menu,press F1 or F2 key to shift between F00-F08

F00 menu group

Notation	Name	Description	Default
SV	setting value SV	Setting value Range defined by(LSPL to USPL)	0
SF00	define the status of F00 group parameters	0: Do not present F00 under quick start menu Press F1,F2,F3 to SV setting mode 1: Present F00 at quick start menu level 1 2: Present F00 at quick start menu level 2 3:Present F00 at quick start menu level 3	0

F01 menu group, for controller with event SV setting features only

Notation	Name	Description	Default
SV1	Event input SV1	SV setting configured by external D1/D2 terminals SV1 D1: open D2:open, SV=SV1	1
SV2	Event input SV2	SV setting configured by external D1/D2 terminals SV2 D1: open D2:close, SV=SV2	2
SV3	Event input SV3	SV setting configured by external D1/D2 terminals SV3 D1: close D2:open, SV=SV3	3
SV4	Event input SV4	SV setting configured by external D1/D2 terminals SV4 D1: close D2:close, SV=SV4	4
SF01	define the status of F01 group parameters	0: Do not present in quick start menu 1: Present F00 at quick start menu level 1 2: Present F00 at quick start menu level 2 3:Present F00 at quick start menu level 3	0

F02 menu group

Notation	Name	Description	Default
AT	AT Auto-tuning	No.: Auto-tuning off Yes:Auto-tuning on	no
AMRS	AM.RS Operating mode	Auto.: auto control mode MAN:manual control mode StoP: stop mode	Auto
AL1	AL1 Alarm 1 value	Alarm value for alarm 1, range -1999~9999	10
AL2	AL2 Alarm 2 value	Alarm value for alarm 2, range -1999~9999	10
UAD	UAD Device address	Define device address in RS-485 system	1
SF02	define the status of F02 group parameters	0: Do not present in quick start menu 1: Present F00 at quick start menu level 1 2: Present F00 at quick start menu level 2 3:Present F00 at quick start menu level 3	1

F03 menu group, some of parameters under F03 might not be displayed due to different controller version

Notation	Name	Description	Default
RAMP	Ramp Ramping up rate	Ramp rate under ramp up heating mode Unit is °C/minute	1
t1	t1 timer range	t1 is a time duration for temperature constant mode or ramp up mode minutes or seconds, t1=0, temperature constant mode disabled parameter t1UN under PASS-0303 define the t1 unit	0
SF03	define the status of F03 group parameters	0: Do not present in quick start menu 1: Present F00 at quick start menu level 1 2: Present F00 at quick start menu level 2 3:Present F00 at quick start menu level 3	0

F04 menu group

Notation	Name	Description	Default
SC	SC Input offset	Input offset, to compenstate the error caused by sensor Range, for temp: -199~199, for analog, -1999 to 1999	0
P1	P1 P1 of output1	Proportional band of output 1, range 0-800 output 1 switch to ON/OFF control when P1=0, Hysteresis is HYS1	20
i1	integral time	Integral time of output 1, range 0-3600 seconds when i1=0, integral off	210
d1	Derivative time	Derivative time of output 1, range 0-3600 seconds When d1=0, derivative off	30
ATVL	Auto-tuning SV offset	Shift the SV value lower to prevent large overshoot during auto-tuning process range -199-199	0
CYT1	Cycle time for output 1	cycle time for output 1, CYT1=20 seconds for relay CYT1=2 seconds, CYT1 not applicable for analog output	20 2
HYS1	Hysteresis for output 1	When P1=0, ON/OFF control, HYS1 0.1-900 Heating: OP1 stop PV>SV OP1 active when PV<SV-HYS1 Cooling: OP1 active when PV>SV+HYS1 OP1 stop PV<SV	0
RST1	Time proportional reset	When i1=0,d1=0, pure proportional control, rSt1 is reset value Heating, out 1%= (SV+rst1-PV)/P1*100% Cooling, out 1%=(PV-SV-rst1)/P1*100% this used to suppress overshoot at start-up for PID control Heating, suppress more when rst 1 gets smaller Cooling, suppress more when rst 1 gets bigger range: -199~199	0
OPL1	minimum output for out1	Minimum output value 0.0 to 100.0%	0.0
OPH1	maximum output for out1	Maximum output value 0.0 to 100.0%	100.0
buF1	Output 1 restrain	Output restrain for analog output, output restriction, only applicable for analog output controller for example, if buF=5%, means the output changing ratio will be less than 5% per second	100.0
PKo1	Initial output %	Define the output ratio when temperature configured as manual output after power on	100.0
oLAP	heating/cooling overlap	Heating/cooling control overlap. range 0-100, overlap area is (SV-OLAP)~(SV+OLAP)	2

To the next page

From the previous page

Notation	Name	Description	Default
GAP2	Cooling control SV offset	Define the cooling control SV value cooling contorl SV=SV+GAP2, Range: 0~200 For example, SV=100, GAP2=10 Then cool side SV=100+10	0
P2	P2 for cooling control	Proportional band for output 2, unit is degree range 0~800, P2=0 for ON/OFF control mode	20
i2	Integral time I 2 for output 2	Integral time for output 2 range 0~3600 seconds i2=0 integral action off	210
d2	Derivative time for output 2	Derivative time for output 2 range 0~3600 seconds d2=0 derivative action off	30
CYt2	Control period for output 2	Control period for output 2, 20 seconds for relay output, 2 seconds for SSR drive output	20 2
HYS2	Hystersis for output 2	When P2=0, on/off control for out2.HYS2,range 0.1 ~900, OP2 active when PV>SV+GAP2+HYS2 OP2 stop when PV<SV+GAP2	0
rSt2	time proportional reset, rSt2	When i2=0, d2=0, proportional control out2 %=(PV-SV-GAP2-rst2)/P2*100% suppress the overshoot after power on range: -199~199	0
oPL2	Minimum output for out 2	Minimum output for output 2 range 0.0~100%	0.0
oPH2	Maximum ouptut for out 2	Maximum output for output 2 range 0.0~100%	100.0
SF04	Define status of F04 group parameters	0: Absent 1:Present in quick start menu 1 2:Present in quick start menu 2 3:Present in quick start menu 3	2

F05 group parameters for controller with soft-start function only

Notation	Name	Description	Default
SFSV	Soft-start SV	SFSV range: -199~3275 StME range: 0~100 minutes Sout range: 0.0~100.0% Soft-start function 1. Power on, heating control, if PV< SFSV, soft start active 2. Power on, cooling control, if PV>SFSV, soft start active 3. MAN indicator flashes, out% = "Sout" value 4. PID heating, when PV ⩾SFSV or StME time reached, soft-start off 5. PID cooling, when PV⩽SFSV or StME time reached, soft-start off 6. MAN indicators off when soft-start terminated 7. StME=0, soft-start function disabled	0
StME	Soft-start period		0
Sout	Soft-start out%		0.0
SF05	Define status of F05 group parameters	0: Absent 1:Present in quick start menu 1 2:Present in quick start menu 2 3:Present in quick start menu 3	0

F06 group parameters for LBA(loop break alarm)and HBA(heater break alarm) only

Notation	Name	Description	Default
LbAt	LBA check time	Under heating mode(100% output),if the temperature did not increase LbAb within LbAt period, LBA will be triggered	80
LbAb	LBA temperature differential	Under cooling mode(100% output), if the temperature did not drop LbAb within LbAt period, LBA will be triggered	2
HbAt	Heater short circuit time	Under heating mode, if temperature increase HbAb , within HbAt period at output 0% HBA goes off	180
HbAb	Temperature differential	Under cooling mode, if temperature drops HbAb within HbAt period at output 0% HBA goes off	10
SF06	Define status of F06 group parameters	0: Absent 1:Present in quick start menu 1 2:Present in quick start menu 2 3:Present in quick start menu 3	0

F07 group parameters

Notation	Name	Description	Default
1LR	ALM1 interlock	if alarm 1 interlocked, 1LR=1 put 1LR=0 can disengage the interlock	0
2LR	ALM2 interlock	if alarm 2 interlocked, 1LR=2 put 2LR=0 can disengage the interlock	0
SF07	Define status of F07 group parameters	0: no shortcut for interlock disengage 1: shortcut for interlock disengage available Press F1 and F2 at the same to quick acess to 1LR and 2LR	0

F08 group parameters

Notation	Name	Description	Default
LcK	Access protection and password for quick start menu 3	=0/1: all parameters can be modified =2: F06 group of parameters locked =3: F05,F06 parameters locked =4: F04,F05,F06 parameters locked =5: F03,F04,F05,F06 parameters locked =6: F02,F03,F04,F05,F06 parameters locked =7: F01,F02,F03,F04,F05,F06 parameters locked =8: F00,F01,F02,F03,F04,F05,F06 parameters locked =0808: Press SET to quick start menu 3	0
SF08	Define status of F08 group parameters	0: Absent 1:Present in quick start menu 1 2:Present in quick start menu 2 3:Present in quick start menu 3	2

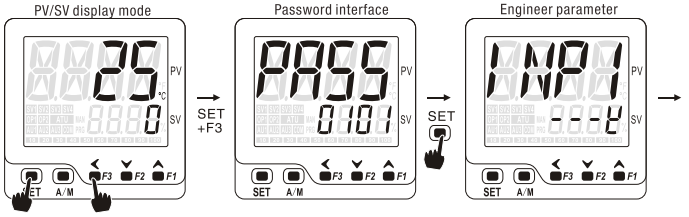
Three approaches to exist and save the configuration under F menu

1: Press SET key for 3 seconds

2: Quick press A/M key once

3:Press SET and F3 at the same time

6.2 Engineer paremeter (PASS-0101 menu)



Depends on the specific functions
some of parameter may or may not be available

Notation	Name	Description	Default	Remark
INP1	Input sensor code selection INP1			

Symbol	E	E	J	N	Wu3_Re25	S	t
input	K	E	J	N	Wu3_Re25	S	t
range	-15 to 1300℃ 0 to 2600 °F	-15 to 800℃ 0 to 1560 °F	-15 to 1000℃ 0 to 1950 °F	-15 to 1300℃ 0 to 2600 °F	0 to 2200℃ 0 to 3276 °F	0 to 1600℃ 0 to 3000 °F	-15 to 400℃ 0 to 782

Symbol	r	b	AN1	AN2	AN3	AN4	Pt
input	r	b	DC0-50mV	DC10-50mV	DC0-20mA DC0-5V DC0-10V	DC4-20mA DC1-5V DC2-10V	Pt100
range	0 to 1769℃ 0 to 3216 °F	0 to 1800℃ 0 to 3276 °F	-1999 to 9999	-1999 to 9999	-1999 to 9999	-1999 to 9999	-199 to 800℃ -326 to 1472 °F

Notation	Name	Description	Default	Remark
dP	Decimal point dP	0 ,1,2,3	0	TC/RTD input, 0: without decimal point, 1: 1 decimal point Analog input: 0: without decimal point, 1: 1 decimal point, 2: 2 decimal points 3: 3 decimal points
UNIt	Display unit UNIt	℃, ° F, no	℃	℃: Celcius ° F:Fahrenheit No:No unit
LSPL	SV lower limit LSPL	Temp: -199~3276 Analog: -1999~9999	0	SV lower limit Remote-SV lower limit input display value
USPL	SV higher limit USPL	Temp: -199~3276 Analog: -1999~9999	400	SV higher limit Remote-SV higher limit input display value
PVOS	input offset PVOS	Temp: -199~199 Analog: -1999~9999	0	To compensate the input error caused by the sensor
PVFt	Input filter strength PVFt	0 to 60	5	1-30 normal input filter strength 31-60 enhanced input filter strength
ANL1	lower limit display for analog input	-1999~9999	0	Display for analog input at its lower limit value "ANL1"
ANH1	higher limit display for analog input	-1999~9999	2000	Display for analog input as its higher limit value "ANH1"
tRSL	Transmission output lower limit tRSL	-1999~9999	0	Display for re-transmission at its lower limit value
tRSH	Transmission output lower limit tRSH	-1999~9999	400	Display for re-transmission at its higher limit value
ALd1	Alarm mode for alarm 1	00 to 16	11	To configure the alarm mode of alarm 1
AH1	Alarm hystersis for alarm 1	0 to 9999	0	Hysteresis value for alarm 1
ALt1	Alarm 1 delay time	0 to 9999 seconds	0	Alarm delay time for alarm 1 only applicable for ALd1=01~06 and 11~16,Alarm 1 will be triggered after delay time ALt1
ALd2	Alarm mode for alarm 2	00 to 16	10	To configure the alarm mode of alarm 2
AH2	Alarm hystersis for alarm 2	0 to 9999	0	Hysteresis value for alarm 2
ALt2	Alarm 2 delay time	0 to 9999 seconds	0	Alarm delay time for alarm 2 only applicable for ALd2=01~06 and 11~16,Alarm 2 will be triggered after delay time ALt2
OUd1	OP1 output mode	0 or 1	0	0: reverse control(heating) 1:direct control(cooling)
bER1	OP1 analog output restriction	0,1,2	0	0: output restriction off 1: output restriction on 2: output restriction on when output increase, restriction off when output decrease
rUCY	motor valve travel time	0-200 秒	60	This parameter assign the travel time for the motor valve means the time for the valve from full open to full close this is only application for motor valve without position feedback
SSRM	Triac triggering mode	Stnd CYCL PHAS	PHAS	Stnd: SSR Drive output, zero-crossing trigger CYCL:Random trigger PHAS:Phase angled trigger
PMd	Program execution mode	0,1,2	0	Only applicable for temp constant and ramp and soak mode 0: Standard mode 1: temp constant mode 2: ramp and soak mode
tSP	TSP	0 to 9999	1	This parameter defines the temperature when the timer kicks in Temperature(TSP) for timer kicks in= SV-tSP when PV ⩾SV-tSP, and stay for 5 seconds then timer kicks in
PEnd	PENd	0、1	1	=0, PID control off when timer finish =1, PID control goes on when timer finish power interruption or press F1 for 3 seconds will re-start
IdNO	IdNO	0-255	1	Device address configuration
bAUd	bAUd	2.4 4.8 9.6 19.2	9.6	2.4 Baud rate 2400 bps 4.8 Baud rate 4800 bps 9.6 Baud rate 9600 bps 19.2 Baud rate 19200 bps
UCR	UCR	N,O,E	N	N: 8 data bit, + No parity+1 stop bit(8N1) O: 8 data bit, + odd parity+1 stop bit(8O1) E: 8 data bit, + Even parity+1 stop bit(8E1)

Alarm mode(ALd_=00~16)

10: No alarm
11: Deviation high alarm
12: Deviation low alarm
13: Deviation high/low alarm
14: Deviation band alarm
15: Process high alarm
16: Process low alarm

00: No alarm
01: Deviation high alarm with standby function
02: Deviation low alarm with standby function
03: Deviation high/low alarm with standby function
04: Deviation band alarm with standby function
05: Process high alarm with standby function
06: Process low alarm with standby function

09: LBA alarm
19: HBA heater short circuit alarm
17: Timer kick-in alarm
18: Timer finish alarm
21: Setting value high alarm
22: Setting value low alarm
23: Process value limit value

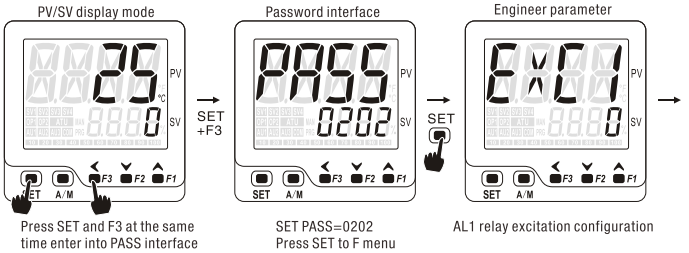
6.2.1 Alarm mode details

Code	ALD □	Specification(Example for alarm 1)
N	10 or 00	No alarm
A	11	AL1⩾0: Deviation high alarm — AH1, Alarm ON; LOW, SV, SV+AL1, HIGH
		AL1<0: Deviation high alarm — AH1, Alarm ON; LOW, SV+AL1, SV, HIGH
B	12	AL1⩾0: Deviation low alarm — Alarm ON, AH1; LOW, SV, SV+AL1, HIGH
		AL1<0: Deviation low alarm — Alarm ON, AH1; LOW, SV+AL1, SV, HIGH
C	13	Deviation high/low alarm — Alarm ON, AH1; AH1, Alarm ON; LOW, SV-AL1, SV, SV+AL1, HIGH

D	14	Deviation band alarm Alarm ON LOW SV-AL1 SV SV+AL1 HIGH
H	15	Process high alarm AH1 Alarm ON LOW AL1 HIGH
J	16	Process low alarm Alarm ON AH1 LOW AL1 HIGH
E	01	AL1≥0: Deviation high alarm with hold action AH1 Alarm ON LOW SV SV+AL1 HIGH
		AL1<0: Deviation high alarm with hold action AH1 Alarm ON LOW SV+AL1 SV HIGH
F	02	AL1≥0: Deviation low alarm with hold action Alarm ON AH1 LOW SV SV+AL1 HIGH
		AL1<0: Deviation low alarm with hold action Alarm ON AH1 LOW SV+AL1 SV HIGH
G	03	Deviation high/low alarm with hold action Alarm ON AH1 AH1 Alarm ON LOW SV-AL1 SV SV+AL1 HIGH
M	04	Deviation band alarm with hold action Alarm ON LOW SV-AL1 SV SV+AL1 HIGH
K	05	Process high alarm with hold action AH1 Alarm ON LOW AL1 HIGH
L	06	Process low alarm with hold action Alarm ON AH1 LOW AL1 HIGH
V	21	SV high alarm When SV≥AL1, AL1 on, When SV<AL1-AH1, AL1 off AH1 AL1 ON LOW AL1 SV HIGH
W	22	SV low alarm When SV≤AL1, AL1 on, When SV>AL1+AH1, AL1 off AL1 OFF AH1 LOW AL1 SV HIGH
P	23	Process value limit alarm
R	09	LBA loop break alarm
Q	19	Heater short circuit alarm
3	17	timer kick-in alarm
4	18	timer finish alarm

Note: The alarm action will be suppressed right after power on even the condition is satistifed, and the alarm standby on works 1 time right after power on, the alarm will go off if the condition satisfied again after supression at the first time

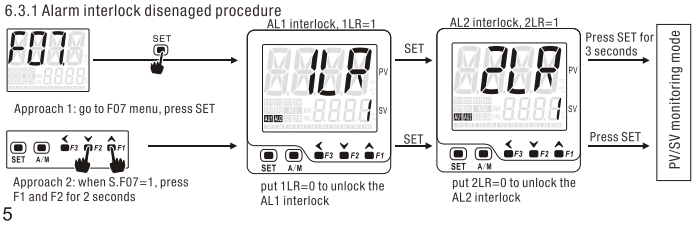
6.3 Engineer paremeter (PASS-0202 menu)


PV/SV display mode
Password interface
Engineer parameter
SET +F3
SET
Press SET and F3 at the same time enter into PASS interface
SET PASS=0202 Press SET to F menu
AL1 relay excitation configuration

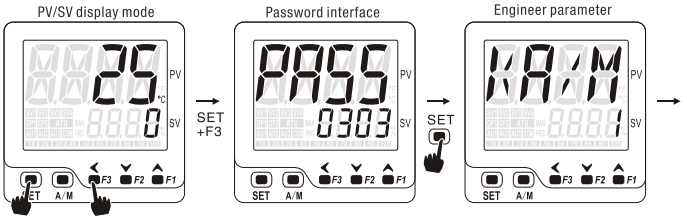
Engineer parameters menu "0202"(PASS-0202)

Notation	Name	Range	Default	Remark
EXC1	AL1 relay excitation	0 ,1	0	0: AL1 relay pull-in when alarm 1 triggered 1: AL1 relay release when alarm 1 triggered
AIL1	AL1 interlock	0, 1	0	0: AL1 output standard mode 1: AL1 output interlock mode
EXC2	AL2 relay excitation	0 ,1	0	0: AL2 relay pull-in when alarm 2 triggered 1: AL2 relay release when alarm 2 triggered
AIL2	AL2 interlock	0, 1	0	0: AL2 output standard mode 1: AL2 output interlock mode

6.3.1 Alarm interlock disenaged procedure


F07
SET
Approach 1: go to F07 menu, press SET
Approach 2: when S.F07=1, press F1 and F2 for 2 seconds
AL1 interlock, 1LR=1
AL2 interlock, 2LR=1
SET
Press SET for 3 seconds
Press SET
PV/SV monitoring mode
put 1LR=0 to unlock the AL1 interlock
put 2LR=0 to unlock the AL2 interlock

6.4 Engineer paremeter menu 3 (PASS-0303 menu)


PV/SV display mode
Password interface
Engineer parameter
SET +F3
SET
Press SET and F3 at the same time enter into PASS interface
SET PASS=0303 Press SET to F menu
Auto/manual control configuration

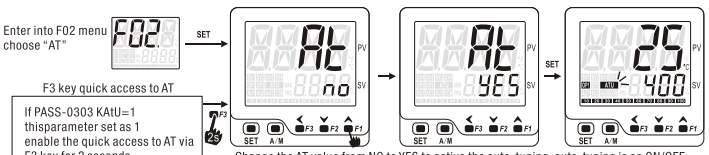
Depends on the specific functions some of parameter may or may not be available

Notation	Name	Range	Factory default	Remark
KA/M	Auto/manual control switch configuration	0 ,1	1	0: A/M key disabled 1: A/M Keky enable(press A/M key 3 seconds to switch)
KR/S	Run/Stop function configuration	0 ,1	0	0: Disable RUN function active by F1 key Disable STOP function active by F2 key 1: Enable RUN function active by F1 key Enable STOP function active by F2 key
KAtU	Auto-tuning short cut key	0 ,1	0	0: Disable auto-tuning active by F3 key 1: Enable auto-tuning active by F3 key
PWON	Power on control mode	0,1,2,3	0	0: Auto control mode after power on 1: Stop mode after power on 2: Manual control mode after power on intial output value defined by PK01 parameter 3: Controller continue the status from where it left off
SFSt	soft-start function configuration	0,1	0	0: Disable soft-start function 1: Enable soft-start function
tRS	Re-transmission configuration	0,1	0	0: PV re-transmission 1: SV re-transmission
PFbK	Position feedback configuration	0,1	0	0: Position feedback disabled 1: Position feedback enable for close loop control
RESV	Remote SV	0,1	0	0: Remote SV off 1: Remote SV on(panel SV setting off) 2: Remote SV on(panel SV setting on)
MoNI	Quick start menu 1 configuraion	0,1,2,3	1	0: MV1,MV2,MVFb absent in quick menu 1 1: MV1,MV2, present in quick menu 1, MVFb absent 2: MVFb present in quick menu 1, MV1,MV2 absent 3: MV1,MV2,MVFb present in quick menu 1
bEAM	Bar graphic display configuration	0,1,2,3	0	0: Bargraphic for OP1 % 1: Bargraphic for OP2 % 2: Bargraphic for TRS% 3: Bargraphic for MVFb%
t iUN	Timer unit	0,1	0	0: Timer unit " second" 1: Timer unit " minute"
REMS	manual output % remote setting	0,1	0	0: Manual output % set via key pad 1: Manual output % set via remote signal

Three approaches to exist and save the configuration under F menu

1: Press SET key for 3 seconds 2: Quick press A/M key once 3:Press SET and F3 at the same time

7. Auto-Tuning


Enter into F02 menu choose "AT"
F02
SET
AT
no
YES
400
F3 key quick access to AT
If PASS-0303 KAtU=1 thisparameter set as 1 enable the quick access to AT via F3 key for 2 seconds

Change the AT value from NO to YES to active the auto-tuning, auto-tuning is an ON/OFF control mode, AT light flashes, AT light off when auto-tuning finished, P.I.D values will be caculated automatically.

Configure the ATVL parameter under F04 menu, the SV can be shifted down to prevent large overshoot during the auto-tuning
Auto-tuning will be terminated if you enter into manual mode or STOP mode or encounter a power interruption
Auto-tuning will be terminated if the AT value change from YES to NO during the auto-tuning process
Under remote SV pattern, the SV will be locked if auto-tuning actived, the auto-tuning SV will be the SV when it was locked, recommend to switch to panel SV setting mode before auto-tuning
*Please start the auto-tuning at the ambinent temp to get best auto-tuing result

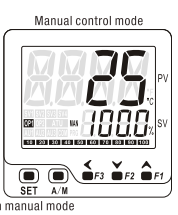
8. Auto manual control switch

Auto/manual switch via parameter menu

Locate AMRS under F02 group
Set MAN as the AMRS value

Auto/manual switch via A/M key on the front panel

If KA/M=1 under PASS-0303 menu then shortcut key A/M on the front is enabled you can switch between auto/manual conotrol on the front panel



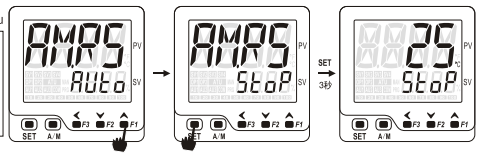
1: Manual control mode, MAN light on
2: Lower display indicates the output %
3: Use F1 and F2 key to quick configure the output % under remote setting mode, the output % will be determined by external analog signals, MAN indicator flashes(refer to PASS-030 REMS)
** Controller can be configured as manual control mode right after power on,the output % defined by parameter Pk01 and POWN parameters

How to switch back to auto control mode from manual mode
1: Goes to F02 menu and locate AMRS, change the value from MAN to Auto. exit and save
2: Press A/M key for 2 seconds to auto control mode

9. RUN/STOP function

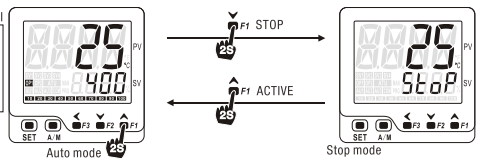
RUN/STOP switch via parameter menu

Goes to F02 menu and locate AMRS
put StoP on the lower display and set to STOP mode
put Auto on the lower display and set to AUTO control mode



Swtich RUN/STOP via F1 on the panel

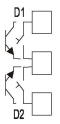
Goes to PASS-0303 menu, set KR/S =1 to enable the shortcut key for RUN/STOP changover
Press F1 for 2 seconds to switch between RUN/STOP



** Output terminated, alarm off under STOP mode

10. SV Panel setting and remote setting

10.1 Remote setting SV, use D1/D2 terminals at the back to set the SV



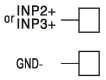
Condition: 1: D1/D2 SV setting function was specified when order
2: PASS-0303 parameter RESV=1 or 2, enable the SV external setting

4 SV can be assigned to SV1,SV2,SV3,SV4 under F01 menu

D1 open/D2 open: SV=SV1, D1 close/D2 open: SV=SV2
D1 open/D2 close: SV=SV3, D1 close/D2 close: SV=SV4

SV1,SV2,SV3,SV4 SV1 SV2 SV3 SV4 on the panel indicates respective SV value(except FT200)

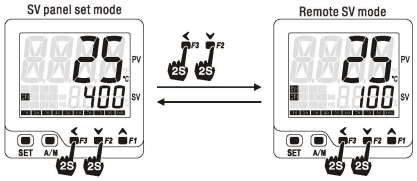
10.2 Remote setting SV via external analong signal input from INP2 or INP3



condition 1: remote SV via analong signal from INP2 or INP3 was specificed when order
2: parameter RESV=1 or 2 (under menu PASS-0303), enable remote SV function
PASS-0101 menu, LSPL corresponding to the lower limit SV when analog singnal at lower limit
USPL cooresponding to the higher limit SV when analog signal at higher limit
SV1 and SV2 indicator SV1 SV2 lights up at the same time indicate the SV is being configured via external analog signal(except FT200)

10.3 Switch between SV remote setting and SV panel setting

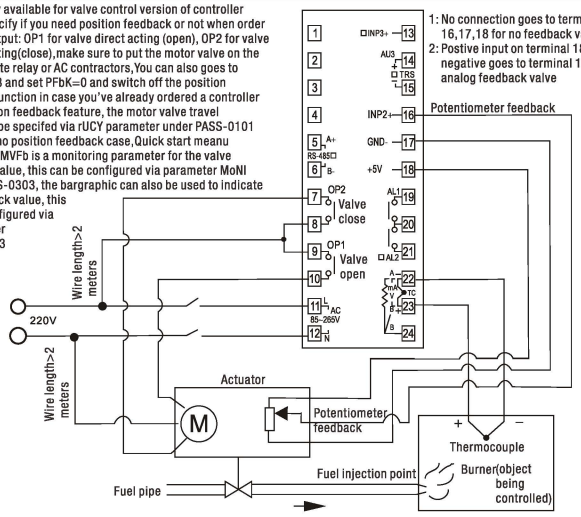
Goes to PASS-0303 and set RESV=2, quick swtich between remote SV setting and panel SV setting enabled, enter into remote SV mode after power on



Press F2 and F3 at the same time for approxi 2 seconds to switch back and forth between SV panel set mode and SV remote setting mode
Only applicable when RESV=2(under PASS-0303 menu)

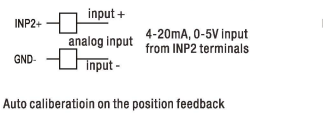
11. Three wires motor valve control

This is only available for valve control version of controller please specify if you need position feedback or not when order with us,output: OP1 for valve direct acting (open), OP2 for valve reverse acting(close),make sure to put the motor valve on the intermediate relay or AC contractors,You can also goes to PASS-0303 and set PFbK=0 and switch off the position feedback function in case you've already ordered a controller with position feedback feature, the motor valve travel time must be specifed via rUCY parameter under PASS-0101 menu in a no position feedback case,Quick start meanu parameter MVFb is a monitoring parameter for the valve feedback value, this can be configured via parameter MoNI under PASS-0303, the bargraphic can also be used to indicate the feedback value, this can be configured via bEAM under PASS=0303

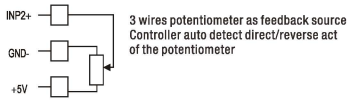


12. Positiion feedback caliberation and operation

Condition
1: Position analong feedback via terminal INP2 ordered(only applicable for 3 wires motor valve or analog output controller)
2: PFbK=1, position feedback enabled for close loop control
General feedback signal, 1) standard analog signal, 2)Potentiometer feedback signal, specify when order

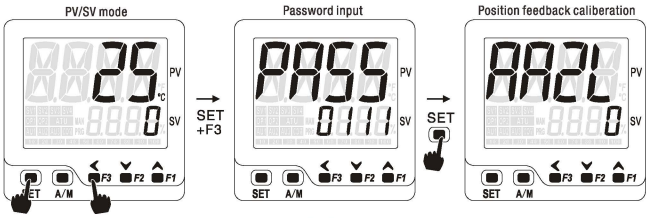


4-20mA, 0-5V input from INP2 terminals



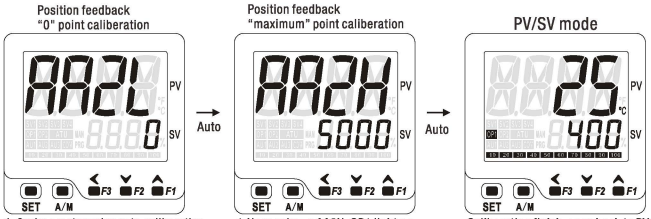
3 wires potentiometer as feedback source
Controller auto detect direct/reverse act of the potentiometer

Auto caliberatioin on the position feedback



PV/SV mode, press SET and F3 at the same time PASS pop-up

Put PASS=0111 press SET to enter



1. 3 wires motor valve auto caliberation
Upper shows AA2L, OP2 light on, OP2 relay pull-in, motor reverse act, lower display changes along with the motor reverse act, display switch to one at right after some while, "0" point caliberation finished
2. Analog output controller
upper shows AA2L, OP1 output at 0% value, lower display changes along with the feedback signal,display switch to the one at right after some while, "0"caliberation finished

1.Upper shows AA2H, OP1 light on OP1 relay pull-in, valve direct act lower display changes along with the direct act, display switch to the right one after some while, caliberation finished

2.for analong output, upper shows AA2H, OP1output 100%,lower display changes along with the valve feedback signal, display changes to the right after some while, process finished

Caliberation finish, goes back to PV/SV mode,these process always carried out automatically, user shall only oberserve the lower display changes, MVFb can be used to monitor the feedback value,MoNI under PASS-0303 used to define the status of MVFb
Bargraphic % display can be used to shows the feedback %, bEAM uner PASS-0303 used to define the status of the bargraphic display

13. Temp constant mode and ramp/soak mode

This is only applicable for programmable version of controller. specify when order

13.1 Parameters that involved

F03 group of parameters

RAMP Ramp and soak mode,Ramp is the temperature increase rate degree per minute, degree/minut

t1 Timer configuration
T1=0 means timer off

Parameter "Unit" under PASS-0303

t1UN Assign the unit for timer
0: unit is second
1: unit is minute

Parameters under PASS-0101

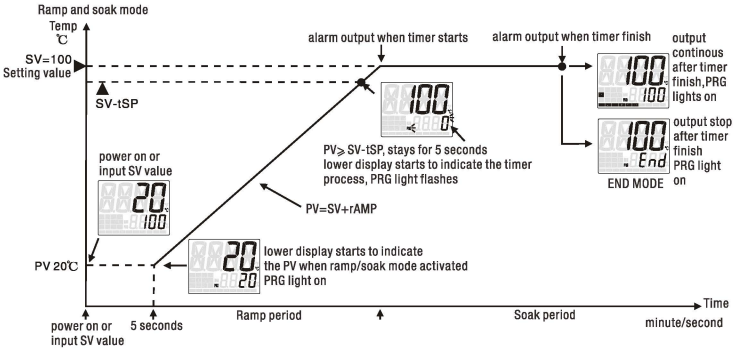
PMd 0: standard type
1: temp constant mode
2: ramp and soak mode

tSP Assign the temperature where timer kick-in constant temp/ramp and soak start temp=SV-tSP when PV≥SV-tSP and stays for 5 seconds, program activated

PEnd Define the control status after timer finished
=0, PID stop working after timer finished
=1, PID continue the output after timer finished
power interruption or press F1 for 2 seconds can re-start the program

13.2 Ramp and soak mode detailed working flow chart PMd=2

1. program execute: power-on, lower display shows SV, this will delay 5 seconds before the program starts, PRG lights on during the ramp and soak process,lower display starts to indicate the PV value, PV increase gradually based on the preset ramp up rate torwards to SV value
2. Timer kick-in: When PV >SV-tSP for at 5 seconds, timer kick-in, lower display shows the timer, PRG flashes,timer range is t1 value, timer starts alarm and timer finish alarm can be configured, refer to PASS-0101 ALd1 and ALd2
3. Timer finish: when timer finish, PRG light on, based on PEnd parameter under PASS-0101, output can be configured as continoue working or stop, when alarm mode=18, alarm will be triggered after timer finish
4. program terminated: if PEND=0 configured, program ends after timer finish, lower display shows "End" main output off, press F1 for 2 seconds can enter into STOP mode or active the program again


Ramp and soak mode
Temp ℃
SV=100 Setting value
SV-tSP
alarm output when timer starts
alarm output when timer finish
output continous after timer finish,PRG lights on
output stop after timer finish PRG light on
END MODE
power on or input SV value
PV≥ SV-tSP, stays for 5 seconds lower display starts to indicate the timer process, PRG light flashes
PV=SV+rAMP
lower display starts to indicate the PV when ramp/soak mode activated PRG light on
PV 20℃
power on or input SV value
5 seconds
Ramp period
Soak period
Time minute/second

13.3 Temp constant mode working flow chart PMd=1

1. Program activate: lower shows SV, and heatup torwards SV immediately
2. Timer kick-in: when PV>SV-tSP, stays for 5 seconds, timer activated, lower display shows timing process, PRG flashes,timer range is t1 value, an alarm can go off when timers starts by configuring the ALd1 or ALd2=17 under PASS-0101
3. Timer finish: when timer finish, PRG light on, based on PENd parameter under PASS-0101, output can be configured as continoue working or stop, when alarm mode=18, alarm will be triggered after timer finish
4. program terminated: if PEND=0 configured, program ends after timer finish, lower display shows "End" main output off, press F1 for 2 seconds can enter into STOP mode or active the program again

14. RS-485 communication brief

(1) Communication based on modbus RTU, support 03 read command, 06 and 10 write command
(2) Communication format, 2 wires system, half-duplex, single drop connection
(3) Communication speed: 2400, 4800,9600,19200 baud rate, data format, 1 start bit+ 8 data bit+parity(N,o.E)+1 /2 stop bit
(4) Support maximum 36 wirte command and 37 read command
(5) Detailed setting goes to PASS-0101 and locate parameter Idn0, bAUd, UCR parameters
(6) Refer to "COM-800-E1" for detailed communication protocol information

15. Input sensors and range

Input type			Code	
K	0.0 to 200.0	℃	K	D2
	0.0 to 400.0	℃	K	D4
	0 to 400	℃	K	A4
	0 to 600	℃	K	A6
	0 to 1300	℃	K	B3
E	0.0 to 200.0	℃	E	D2
	0.0 to 300.0	℃	E	D3
	0 to 200	℃	E	A2
	0 to 400	℃	E	A4
	0 to 800	℃	E	A8
J	0.0 to 300.0	℃	J	D3
	0.0 to 400.0	℃	J	D4
	0 to 300	℃	J	A3
	0 to 400	℃	J	A4
	0 to 1000	℃	J	A0
T	0 to 300	℃	T	D4
	0 to 400	℃	T	A4
S **	0 to 1600	℃	S	B6
R	0 to 1769	℃	R	B8
B	200 to 1800	℃	B	B8
N	0 to 1300	℃	N	B3
Wu3_Re25	600 to 2200	℃	W	B0

Input type			Code	
Pt100	0.0 to 100.0	℃	D	D1
	0.0 to 200.0	℃	D	D2
	-50.0 to 200.0	℃	D	G2
	-100.0 to +200.0	℃	D	F2
	-199.9 to +200.0	℃	D	F3
	0 to 100	℃	D	A1
	0 to 200	℃	D	A2
	0 to 400	℃	D	A4
	0 to 800	℃	D	A8
	-100 to 200	℃	D	C2
	-200 to 400	℃	D	C4
	-200 to 600	℃	D	C6
	-200 to 800	℃	D	C8

Input type			Code	
AN1	0 to 50mV	-1999 to 9999	V	02
AN2	10 to 50mV		V	10
AN3	0 to 5VDC	-199.9 to 999.9	V	03
AN3	0 to 10VDC		V	04
AN4	1 to 5VDC	-19.99 to 99.99	V	08
AN4	2 to 10VDC		V	09
AN4	4 to 20mA	-1.999 to 9.999	A	03
AN3	0 to 20mA		A	02
AN3	0 to 10mA		A	01

The accuracy is not guaranteed for type S thermocouple in the range of 0-100
Remark 1: user can switch input between thermocouple and RTDs via software
Remark 2: analong input except 0-50mA, 10-50mV needs to be specified when order